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DEDICATION

Initial remarks and acknowledgments: Isolated perfused tubule symposium

The study of kidney function has been advanced steadily by the application of various technical and methodologic developments. The development and application of whole kidney clearance techniques [1–4] greatly expanded our knowledge of renal function. Indeed, well designed clearance studies still contribute to our understanding of renal function. However, recognition of the limitation of clearance studies to address certain questions answerable only by direct evaluation of nephron function led to the further development and application of in vivo micropuncture by Richards and Walker in amphibia [5] and Walker and Oliver in mammals [6]. Needless to say, micropuncture has been and remains a powerful investigative tool. Micropuncture and clearance techniques, although maintaining certain distinct advantages, also have one main limitation—the inaccessibility of all nephron segments for direct study.

This restriction was eliminated in 1966 with another major technical advance first described by Burg et al [7]. The technique allowed individual segments of nephrons to be perfused in vitro. Although in vitro microperfusion has its own limitations, it does have the distinct advantage that all nephron segments can be studied and the luminal and peritubular environments can be selectively and specifically altered. Thus, many important issues raised by whole kidney and in vivo micropuncture studies could be examined.

During the past 16 years this technique has served as the basis of several hundred publications and has spearheaded the development of a significant number of new concepts. Below is only a partial listing of the new developments attributable to in vitro microperfusion studies:

- Identification of active chloride transport in the thick ascending limb of Henle;
- Demonstration of intrinsic transport differences among diverse segments of the proximal tubule;
- Description of the site and mechanism of action of various hormones and second messengers on salt and water transport;
- Proposal of a new model of the countercurrent multiplication system without active transport in inner medulla;
- Detailed description of divalent anion and cation transport in the various nephron segments;
- Significant advancement in understanding the mechanism of H^+/HCO_3^- transport across segments of proximal and distal nephrons;
- Furthering our understanding of organic anion and cation transport;
- Specific localization of the site of action of various diuretics;
- In vitro evaluation of nephronal adaptive response to in vitro manipulation such as uremia and changes in acid-base balance.

In view of the major contribution that in vitro microperfusion has made to our current understanding of renal function, we feel it is timely to dedicate an issue of *Kidney International* to information obtained by isolated tubule perfusion techniques. We also felt it would be appropriate to begin this symposium with a recollection of how the technique of in vitro microperfusion began. For this reason we asked Moe Burg to write a special introductory section. All of us in the field of isolated perfused tubule research appreciate the development of this technique by Moe Burg and his colleagues at the National Institutes of Health. In our initial instructions to the various other contributors we asked them specifically to concentrate on the in vitro microperfusion literature, integrating it, when appropriate, with the literature as a whole. In addition, we felt that this topic should be covered in two parts: first, a presentation of the transport characteristics of each nephron segment from the early proximal convoluted tubule to the papillary collecting duct; and second, a presentation of certain physiologic perspectives gained from isolated tubule studies.

We are excited by the manuscripts which were submitted for this symposium and we would like to extend our sincere appreciation to each of the contributors. Furthermore, we must express our special thanks to three of our postdoctoral fellows: Drs. Tom Daniel, Lee Hamm, and Victor Schuster who helped us review these manuscripts for publication. We also want to acknowledge the efforts of Ms. Kay Williams in helping us compile this symposium.

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